MAY, 1904.

ENTOMOLOGICAL NEWS

Vol. XV. No. 5

Ignotus ænigmaticus Slosson.

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PHILADELPHIA:
ENTOMOLOGICAL ROOMS OF
THE ACADEMY OF NATURAL SCIENCES,
LOGAN SQUARE.

Entered at the Philadelphia Post-Office as Second-Class Matter.

ENTOMOLOGICAL NEWS

Published monthly, **excepting July and August,** in charge of the Entomological Section of the Academy of Natural Sciences, Philadelphia, and the American Entomological Society.

ANNUAL SUBSCRIPTION, $1.00 IN ADVANCE.

Outside of the United States and Canada, $1.20.

Advertising Rates: 30 cents per square inch, single insertion; a liberal discount on longer insertions. No advertisement taken for less than 60 cents—Cash in advance.

All remittances should be addressed to ENTOMOLOGICAL NEWS, Academy of Natural Sciences, 19th and Race Streets, Philadelphia, Pa.

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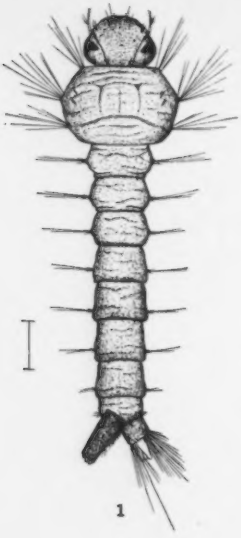

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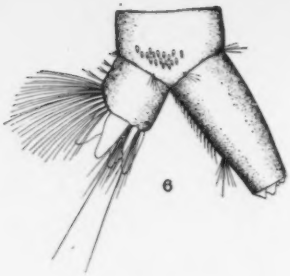

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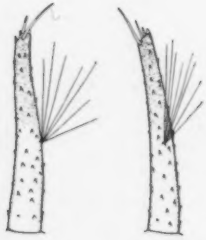

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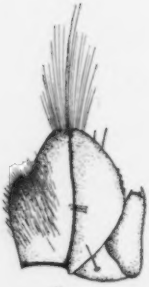

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CULEX TRIVITTATUS COQ.

ENTOMOLOGICAL NEWS

AND

PROCEEDINGS OF THE ENTOMOLOGICAL SECTION

ACADEMY OF NATURAL SCIENCES, PHILADELPHIA.

VOL. XV. MAY, 1904. No. 5.

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Notes on Some Mosquito Larvae Found in New Jersey.

BY JOHN B. SMITH

(With Plates IX, X, XI, XII.)

Culex trivittatus Coq.

This is a grayish-black mosquito, with two white longitudinal stripes on the dorsum of the thorax. The legs and the beak are not banded, while the segments of the abdomen are white marked laterally and often across the dorsum.

Larvæ were first taken by the Messrs. H. H. and E. Brehme, who were exploring the woodland pools on the hills back of South Orange. Each turned in a bottle of larvæ and pupæ that were determined to be a mixture of *Conchyliastus musicus* and *Culex sylvestris*. From the E. Brehme bottle, *C. musicus* and *C. sylvestris* adults emerged July 2d, and in addition several examples of what was recognized as a species new to us. The remaining larvæ were closely examined, but could not be differentiated from *sylvestris*. Meanwhile a large number of pupæ had developed and from these and from the collected stock *C. trivittalus*, *C. sylvestris*, *C. canadensis*, *C. territans* and *C. musicus* emerged. No larvæ of *trivittatus* were obtained from this series.

From the H. H. Brehme bottle there emerged, on July 2d, *C. musicus*, *C. sylvestris* and *C. trivittatus*. July 3d, *musicus* and *sylvestris* hatched. The larvæ were carefully examined in alcohol, and three full-grown individuals were separated out as probable *trivittatus*.

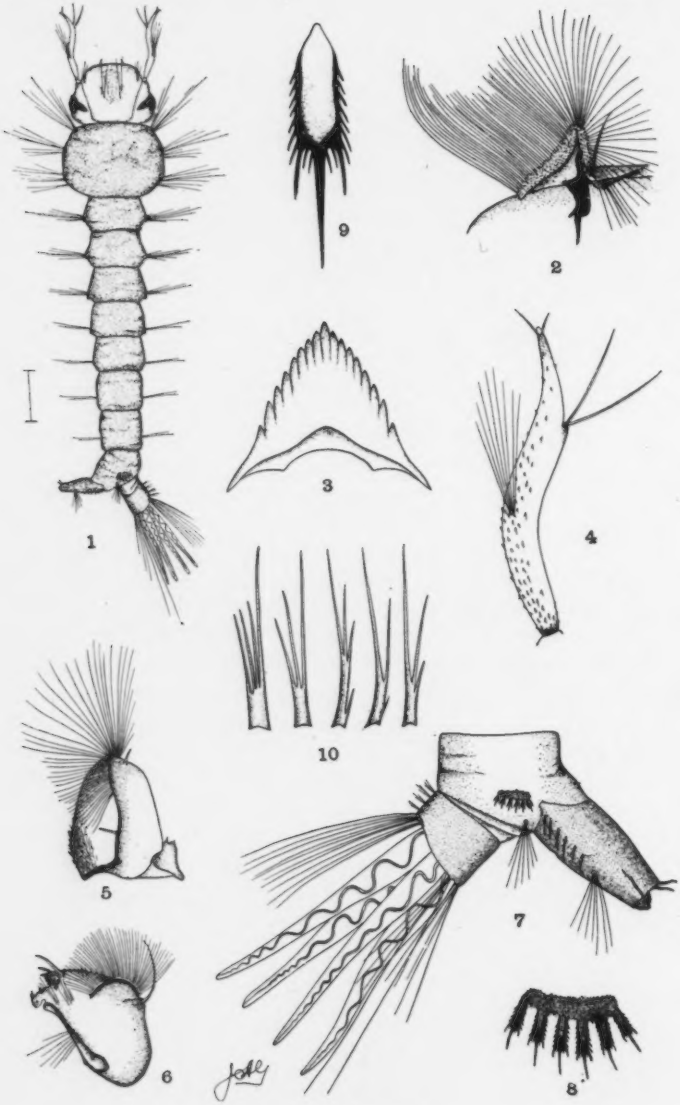
A second collection made by Mr. E. Brehme, July 1st, yielded more adults and larvæ. Collections made in the Hatfield Swamp, August 11th and 12th, also by Mr. Brehme, yielded yet further specimens, always in company with *C. sylvestris*.

Outdoor captures of *C. trivittatus* adults were made July 2d, at Trenton, by Mr. Grossbeck; July 4th and 5th, at Chester, by Mr. Dickerson; July 13th at Summit, July 17th and 18th at Deckertown, July 21st and 22d at Lake Hopatcong, all by Mr. Grossbeck, and September 3d, in the Great Piece Meadow, by Mr. E. Brehme.

The larva (Plate ix, fig. 1) is a stout, rather chunky wriggler, grayish in color, 7 to 7½ mm. in length, and in general build like *sylvestris*, with which it occurs. The head is comparatively small, one-third wider than long, evenly rounded in front, brownish in color, darker at the base and blotched on the vertex. The antenna (fig. 2) is less than half the length of the head, sparsely set with rather large spines, tapering a little toward the tip which is blunt, set with one long and one short spine, a bristle and a stout little articulated peg. The mandible (fig. 3) is set with small spines on the dorsal surface of the base, and this is one of the few species so distinguished. The mentum is triangular, the height at centre is equal to two-thirds the base, the lateral margins are a little curved, the teeth are small. The maxillary palpus is shown at figure 5; the mouth brushes are of the usual form, its hairs pectinated.

Thorax somewhat angulated at the sides, marking the segments, and with a tuft of long hair at each angle. It is somewhat wider than long, with two transverse depressions on the dorsal surface.

Abdomen with the segments well marked, each with a lateral tuft of long hair, decreasing in length posteriorly. The comb on the eighth segment is arranged in an irregular patch



CULEX DISCOLOR.

of from 14 to 22 scales, as shown at figure 6. The individual scales are shown at figure 7, and are ovate, the sides fringed with spines which lengthen toward the tip, so that at this point there is a long straight barb.

The anal siphon (fig. 6) is short and chunky; very dark brown, almost black, in color. It has the usual double series of spines, and these are of moderate length, taper rapidly to a long acute tip, and tend to have short teeth near the base on the inner side.

The anal gills are short, without obvious tracheæ, and the species has the normal *Culex* habit of getting air through the siphon only.

Culex discolor.

This is a yellowish-brown mosquito, of moderate size, the body mottled and variegated with brown, legs and beak banded, wings spotted. This combination occurs in no other New Jersey species, and makes it an easily recognizable form.

Larvæ were collected by Mr. W. P. Seal, at Delair, June 18, 1903, and received at the laboratory June 20th. They were recognized as new to us, attracting attention, first, by their unusually prominent, white antennæ; second, by the very long anal gills; third, by the habit of resting on the bottom, back down, antennæ pointing upward, and mouth-brushes kept in constant motion. Pupæ were formed June 23d and 24th, and on the 27th and 28th adults emerged,—a pupal period of four days. A second lot was received July 24th, but they were small, did not do well, and only one female adult was secured August 8th. Mr. Seal states that these larvæ are rare, and he noted their habit of remaining below the surface and feeding at or near the bottom. A single larva was also received from Mr. J. T. Brakeley, taken at Lahaway, Ocean County.

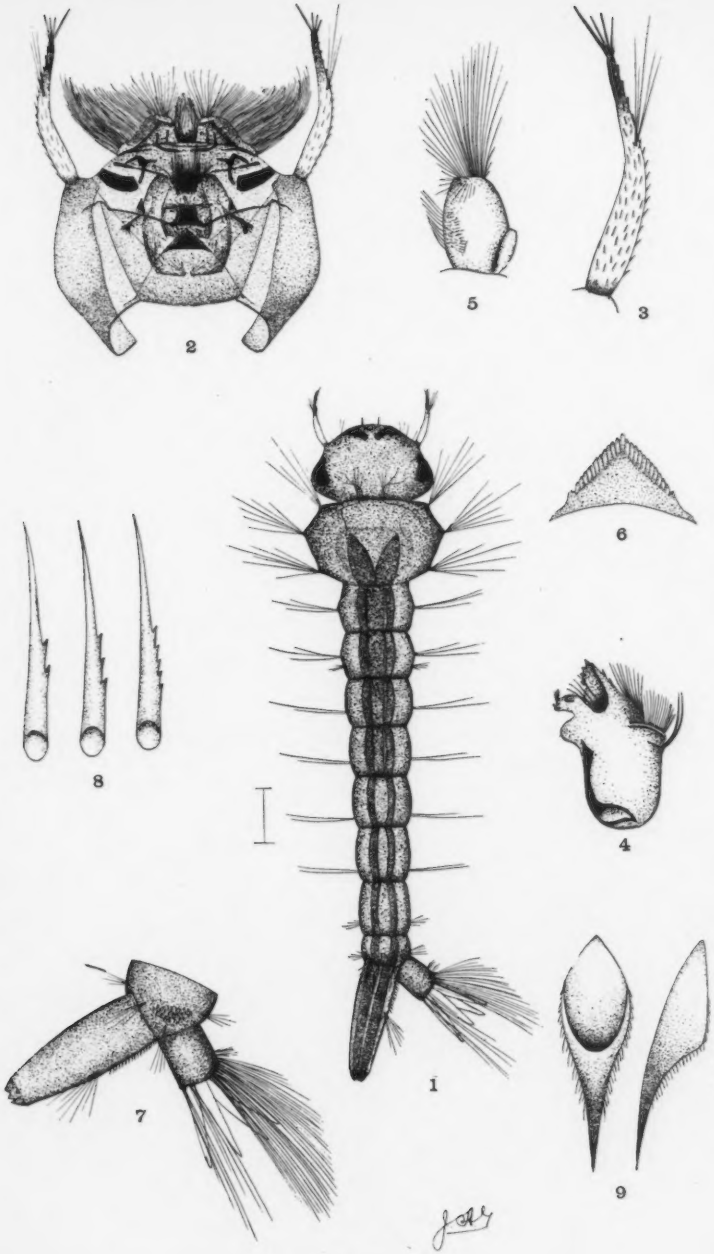
The larva (Plate x, fig. 1) is from 7 to 8 mm. in length, including the anal siphon, and is yellowish brown in color throughout. The head is almost as large as the thorax, widest at the eyes, a little excavated before the antenn , front square. The antennæ (Plate x, fig. 4) are white, almost as long as the head, thickest centrally, with an out- and an

in-curve, terminating almost in a point. The tuft is well below the middle, and consists of about a dozen hairs that do not reach to the tip. The two long, spine-like hairs on the inner side, half way between the tuft and the tip, represent two of the four articulated spines usually found terminating the antennæ. The mandibles (Plate x, fig. 6) are peculiar in that they have only a single dorsal spine; all the other New Jersey species have two or more. The mouth-brushes (Plate x, fig. 2) are entirely composed of simple hair. Mentum triangular, almost as long as wide, with nine teeth to each outer edge. The thorax has rounded outer margins and is somewhat wider than long. Abdominal segments subequal, narrowing a little backward, curiously shaped in connection with the oblique base of the siphon. The comb or pecten (Plate x, fig. 8) consists of a series of from 5 to 8 scales attached to a narrow band like a fringe, and not directly set into the skin. The individual scales (Plate viii, fig. 9) are oblong, the sides fringed with spines, two longer spines at each lower angle, and a very long pointed process extending centrally. The anal siphon (Plate x, fig. 7) is small for the insect, about three times as long as wide, with two curved spines at apex, an unusually large hair tuft below the spines, and a series of from five to eight slenderly toothed spines on each row. The individual spines (fig. 10) vary somewhat, but always have the long, slender processes. The anal gills are twice as long as the siphon, taper to almost a point, and are well provided with tracheæ, indicating the bottom habits of the larva.

Culex aurifer Coq.

This is a medium-sized, rather long-legged mosquito, with unbanded beak, legs and abdomen. The thorax is golden brown, with the disc black, forming an indefined central band. It bites viciously, but seems to be very local even in the territory where it has been found.

Larvæ were taken by Mr. J. Turner Brakely, at Lahaway, late in April and in May, 1902. They occurred at a few points only in larger bodies of water, mixed with *canadensis;* but very rare, comparatively. One of the places where they were found



CULEX AURIFER COQ.

was in the water covering a cranberry bog. This bog was dry all during the summer of 1902 and until late in fall, when all adult mosquito life had disappeared into hibernation or elsewhere. The larvæ were found so early that there could not have been any eggs laid by hybernating individuals. It is probable, therefore, that the eggs were laid on the bog itself during the summer of 1902, like those of *canadensis*, and that they hatched as soon as the temperature of the water began to rise well above the freezing line. The habits of the larvæ are normal for the genus, and the duration of the pupal stage varies from two to five days.

The larva (Plate xi, fig. 1) is from 7 to 9 mm. in length, brownish black, tapering a little posteriorly. The head is transversely elliptical, almost as broad as the thorax, broadest just behind the eyes. The antenna (fig. 3) is white, tipped with black, almost half as long as the head is broad, thickest near base, tapering slightly to about the middle, then curved inwardly to a blunt tip. The surface is set with small spines, there are three long and one short spines at the apex, as well as a little articulated peg. The tuft consists of from 6 to 10 hairs, and is situated above the middle at the obtuse angle formed by the curve. In life the antennæ are very conspicuous, the black tip contrasting strongly with the white base. The mentum (fig. 6) is broadly triangular, the height at middle equalling about half the width. Figure 2 shows the head drawn from a cast skin, while the mandible and maxillary palpus are respectively shown at 4 and 5. The hair on the mouth-brushes is simple.

The thorax is transverse, edges of the segments marked so as to form three angles, each angle marked by a tuft of long hair arising from a distinct tubercle. There are two smaller tufts at the cephalic margin.

Abdominal segments 1 to 6, inclusive, have lateral tufts of long hair; segment 2 has an additional tuft of short hair nearer the hind angle, while segments 7 and 8 have short tufts only. On the eighth segment the lateral combs consist of patches of from 25 to 30 scales each, arranged as shown at figure 7; an individual scale being shown from above and from the side at

figure 9. Figure 7, by the bye, was drawn from a cast skin, and the tube, from pressure, is made to appear broader in proportion than is natural. The anal siphon is three and one-half times as long as the width at base, and does not taper much toward the apex. The two rows of spines contain each from 14 to 20 small, slender, pointed processes, the inner edge of which is shortly toothed, as shown at figure 8.

The anal gills are only a little longer than the ninth segment, and are not prominent nor supplied with obvious tracheæ. Evidently this is a species that depends entirely upon getting its air supply through the surface film of the water in which it lives.

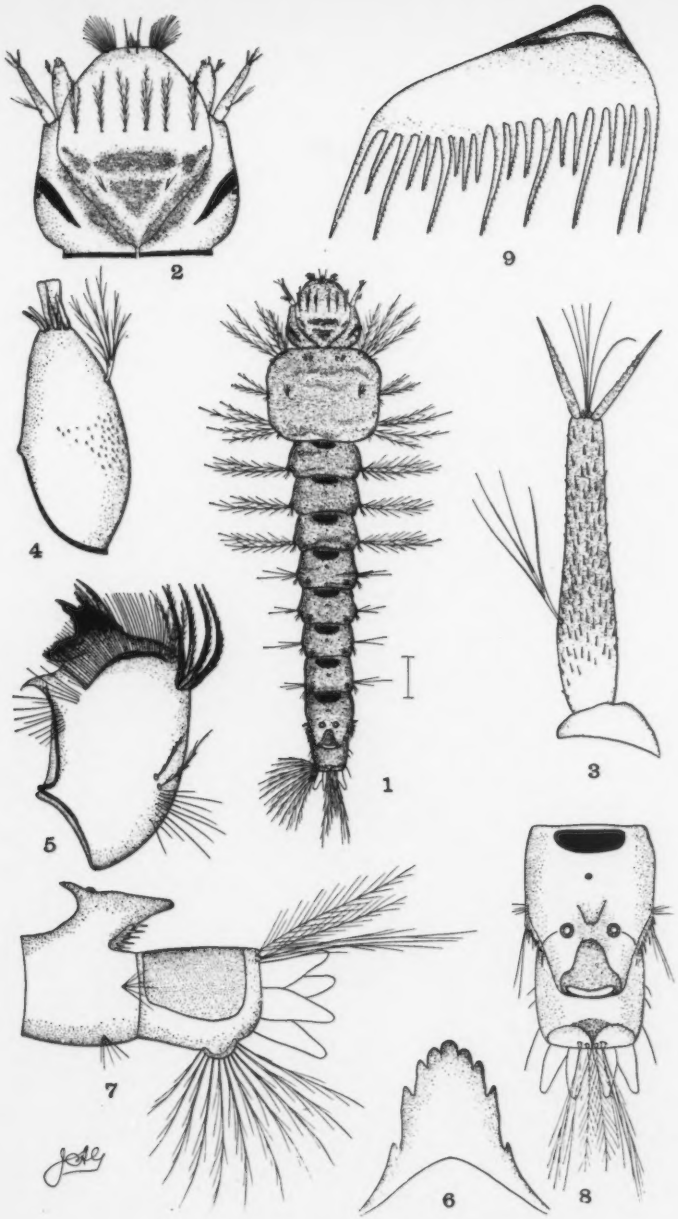
Anopheles crucians Wied.

This is a little the smallest of the three species that occur in New Jersey and, in a way, is intermediate between them. The wings are more spotted than in *maculipennis*, less so than in *punctipennis;* the last vein is white, marked with three black spots. The palpi are white marked at the base of the joints.

A specimen was bred by Dr. H. P. Johnson in 1902, from a mixed lot of pupæ, probably received from Delair, N. J. Two specimens were taken in the same year, at Lahaway, by Mr. J. Turner Brakeley. Several specimens came in material received from Mr. W. P. Seal, at Delair.

In 1903 a very fresh-looking specimen was taken by Mr. Grossbeck, July 30th, at Port Reading, and this is the northernmost point in New Jersey where the species has occurred.

Among the mosquitoes that came to the porches at Cape May, soon after sunrise in midsummer, I detected this species, and instructed Mr. Henry L. Viereck to locate the breeding-places and work out the life-history. He finally located the breeding-areas in the Cape Marsh, and examples of the larvæ were sent in, August 3d, September 5th and September 28th. The records show their occurrence almost continuously between these dates, and the adults also were recorded almost daily. The females began their attack before sundown, and were again active for some little time after sunrise. During the latter part of the season the period of activity lengthened,



ANOPHELES CRUCIANS WIED.

beginning while the sun was yet well above the horizon and continuing until the middle of the morning. Should this species prove to be a malaria-carrier, there would be no chance of avoiding it without confinement in a mosquito-proof shelter from 3 P.M. of one day to 11 A.M. of the next. Indeed, on cloudy days specimens are on the wing almost all day.

In general appearance the larva does not differ from those of *maculipennis* and *punctipennis*, but range only from 5½ to 6 mm. in length. The color in general is a dirty grayish brown, the chitinized parts a clear light brown; but this differs and, in life, the specimens vary as much as in the case of the other species. The head (Plate xii, fig. 2) is broadest just behind the eyes, narrowing to a rounded front, the line interrupted by an offset bearing the antenna. This offset is really a distinct sclerite, immovably attached to the head, upon which the antenna is articulated. The maculation of the head is variable; but, as a rule, the larger blotches are central, with smaller spots arranged about it. There is a transverse row of six branched hairs before the middle. The antenna (fig. 3) is set with little spines, and is shorter, stouter and much darker than in the allied species. At the tip are two long spines or blades, partly serrated, on the inner edge two short articulated processes, and six long hairs. A four-branched hair arises from the shaft about one-third from base. The mouth-brushes are very dense, the hairs simple. The mentum (fig. 6) is elongate, obtusely triangular, with only a few blunt teeth, similar to that in the allied species. The mandible (fig. 5) differs from that of *maculipennis* and *punctipennis* by having four instead of three curved spines on the dorsal surface. The maxillary palpus (fig. 4) has four spines and two spatulate processes at its tip, and at a distance of about one-third from tip a thick spine which divides into a number of branched hairs.

Thorax subquadrate, the angles rounded, with six lateral tufts of branched hairs, and similar smaller tufts on the dorsum.

The first three segments of the abdomen have long, branched hair laterally, the next four have small tufts of simple hair,

the eighth segment is provided with lateral combs of from 6 to 8 long teeth and from 1 to 4 short teeth, like figure 9, between them. On all these segments there is a small chitinized plate near the anterior margin and around spot behind,—all most obvious on the hinder segments. Joints 3 to 7 have also a palmate hair on each side near the posterior margin. Figures 7 and 8 show a lateral and dorsal view, respectively, of the respiratory structures. The ninth segment bears a chitinized saddle; on the dorsal surface are two plumose hairs and a tuft of long, sparsely branched hairs. On the ventral surface is a fan-like tuft of branched hair. The tracheal gills are less than half as long as those in *A. maculipennis* or *A. punctipennis.*

Altogether, this larva is separable from those of its allies by satisfactory, readily recognizable characters.

The Coleoptera of the Sacramento Mountains of New Mexico.—II.

By W. Knaus, McPherson, Kansas.

I include under the above head several species of *Cicindelidæ* and a few other species taken at Santa Rosa and Alamogordo, New Mexico.

My second trip to the Sacramento Mountains was made the first week in August, 1903. and a week was spent at Cloudcroft and immediate vicinity. Collecting covered the dates August 3rd to 10th. Many species taken in June, 1902, were also found here in August, but a majority of the species had disappeared and had been succeeded by others at the latter date. Insect life in general, however, was not so prolific as in the earlier months of the year previous.

The elevation of Cloudcroft, 9000 feet, made the nights cool, and on only one evening, August 9th, was the temperature high enough to tempt any considerable numbers of Coleoptera to come to the electric lights.

The total number of species in this list, about 130, includes none that were given in my first list, published in the News for June, 1903. Of those listed in this paper, Mr. T. D. A. Cockerell informs me that eight genera and twenty-five species

are new to the New Mexican fauna. The collecting the past two seasons in these mountains has added more than seventy-five species and twenty-five genera to the New Mexican list of Coleoptera.

Thanks are due to Mr. H. C. Fall, of Pasadena, California, for identifications, and to Mr. T. D. A. Cockerell, of Colorado Springs, Col., for notes.

Collections July 31st were at Santa Rosa, and August 10th at Alamogordo.

N. = new to New Mexico. G.N. = genus new to New Mexico. R. = recorded (in N. M.) only from.

1, 12 *Tetracha carolina* Linn. At electric light, Alamogordo.

2, 25*c* *Cicindela cimarrona* Lec. In canyon near summit, over 8500 ft. high, Cloudcroft; only one specimen taken but others seen.

3, 28 *Cicindela fulgida* Say. On alkali flats near Santa Rosa; common. R. Albuquerque.

4, 40 *Cicindela punctulata* Fab. Santa Rosa, on alkali flats.

5, 40*a* " *micans* Fab. Common at Santa Rosa, on alkali flats. Brilliant blue and green colored specimens.

6, 51 *Cicindela sperata* Lec. Found on wet mud along margin of Pecos River, Santa Rosa.

7, 57 *Cicindela lemniscata* Lec. Taken in numbers at electric light at Alamogordo.

8, 58 *Cicindela circumpicta* Laf. Common on alkali flats at Santa Rosa.

9, 59 *var.* " *apicalis* W. Horn. On alkali flats near Santa Rosa. N.

10, 64*b* " *16 punctata* Klug. One specimen at the edge of Pecos River Santa Rosa.

11, 86 *Cychrus elevatus* Fab. One specimen, much more slender than typical form, was taken in canyon near Crystal Springs canyon, near Cloudcroft, at an elevation of 8500 feet, August 9th. One of the most southern records of this species. R. Beulah, Gallinas Canyon and Santa Fé Canyon, all in northern New Mexico.

12, 119*b* & *c* *Carabus agassizi oregonensis* Lec. Rather common in the canyons near Cloudcroft, under logs, chips, etc. Listed as a variety of *tædatus* in New Mexican lists.

13, 133 *Calosoma peregrinator* Guer. One specimen under electric light at Alamogordo.

14, 134 *Calosoma lugubre* Lec. One specimen at Cloudcroft. R. Roswell.

15, 388 *Bembidium intermedium* Kirby. Santa Rosa; common.

16, 678 *Amara remotestriata* Dej. Several specimens at Cloudcroft. R. Santa Fé Canyon (Snow), top of Las Vegas Range

(Cockerell), Las Vegas (Martin Cockerell), Las Vegas Hot Springs (Cockerell), Havery's Ranch (Miss Ruth Reynolds), all in northern New Mexico.

17, Small Carabid near *Bembidium*, one specimen at electric light at Alamogordo.

18, 756 *Platynus dissectus* Lec. Number of specimens taken, but always singly; specimens not quite typical; Cloudcroft.

19, 940 *Cymindis cribricollis* Dej. Two specimens, Cloudcroft. New to southern New Mexico.

20, 1054 *Nothopus zabrodes* Lec. One or two specimens, Cloudcroft.

21, 1168 *Discoderus impotens* Lec. Two specimens, electric light. Alamogordo.

23, 1158 *Bradycellus rupestris* Say. One specimen at electric light, Alamogordo. New to southern New Mexico. Var. *congener* occurs in Mesilla Valley.

24, 1495 *Thermonectes ornaticollis* Aube. One specimen, Santa Rosa. N.

25, 1586 *Tropisternus triangularis* Say. Electric light. Alamogordo.

26, 1626 *Philhydrus nebulosus* Say. One specimen, Santa Rosa.

27, 9318 *Cymbiodyta morata* Horn. Two specimens, James Canyon, near Cloudcroft. R. near the Moqui villages.

28, 1700 *Necrophorus guttula* Mots. Two specimens, Cloudcroft.

29, 1706 *Silpha lapponica* Hbst. One specimen, Cloudcroft.

30, *Agathidium* sp. One specimen, Cloudcroft.

31, 32, 33, 34, *Aleochara*. Four species under decaying bark and at sap.

35, 2098 *Quedius explanatus* Lec. Several specimens under stones and logs. R. Santa Fé Canyon.

36, 2100 *Quedius fulgidus* Fab. One specimen, Cloudcroft. R. Albuquerque.

37, 2148 *Tympanophorus puncticollis* Er. One specimen, Cloudcroft. N. genus and species.

38, 2167? *Philonthus hepaticus* Er. One specimen, Cloudcroft. R. Las Vegas.

39, *Staphylinid* specimen near *Lithocarus*, under bark, near Cloudcroft.

40, *Tachyphorus*, sp. dubious. One specimen, Cloudcroft.

41, *Medon*, species probably not described. One specimen, Cloudcroft.

42, 4683 *Pseudopsis sulcata* Newm. One specimen, Cloudcroft. N. (genus and species).

43, 2782 *Apocellus sphæricollis* Say. One specimen, Santa Rosa.

44, 2841 *Homalium pucillum* Grav. Three specimens, Cloudcroft. N.

45, 2900 *Siagonum punctatum* Lec. One specimen, under bark, Cloudcroft. N. (genus and species).

46, *Bæocera* n. sp. near *speculifer* Casey. Cloudcroft. G.N.
47, *Olibrus*, sp. dubious. One specimen, Wootens near Cloudcroft.
48, 2996*a* " *nigricollis* Lec. Common at Wootens near Cloudcroft. N.
49, 3000 *Olibrus semistriatus* Lec. Same as 2996*a*. R. Beulah.
50, 3037 *Megilla viltigera* Mann. Santa Rosa and Cloudcroft.
51, 3056 *Coccinella trifasciata* Linn. Four specimens at Wootens.
52, 3069 *Harmonia picta* Rand. One specimen, Wootens.
53, *Anatis lecontei* Casey. One specimen near Cloudcroft.
54, 3078*a* *Psyllobora tædata* Lec. Two specimens at Wootens.
55, 3101 *Hyperaspis fimbriolata* Melsh. Two specimens near Cloudcroft.
56. *Scymnus* sp. One specimen, Wootens.
57, 9914 *Lasconotus concavus* Cas. One specimen, Cloudcroft. N. (genus and species).
58, *Narthecius* sp. One specimen, Cloudcroft. G.N.
59, 3525 *Hister punctiger* Lec Two specimens, Cloudcroft. R. Beulah.
60, 3586 *Saprinus oregonensis* Lec. Several specimens, Santa Rosa.
61, " New sp. near *pectoralis* group. Santa Ro.
62, 3673 *Carpophilus pallipennis* Say. One specimen, Cloudcroft.
63, 3719 *Nitidula bipunctata* Linn. Two specimens near Cloudcroft. N.
64, 3769 *Rhizophagus procerus* Cas. One specimen, Cloudcroft. N.
65, 3810 *Melanophthalmus americana* Mann. Two specimens, Cloudcroft.
66, *Europs* n. sp. One specimen, Cloudcroft. G. N.
67, 4065 *Epiphanis cornutus* Esch. One specimen, Cloudcroft. N. G. & S.
68, 4253 *Drasterius elegans* Fab. Two specimens at light, Alamogordo.
69, *Elater* sp. One specimen, Cloudcroft.
70, 4322 *Melanotus fissilis* Say. Two specimens, Cloudcroft.
71, 4400 var. *Athous cribratus* Lec, Two specimens, Cloudcroft.
72, 4606*a* *Buprestis rusticorum* Kirby. One specimen, Cloudcroft.
73, 4814 *Ellychnia californica* Mots Two specimens, Cloudcroft.
74, 5002 *Collops bipunctatus* Say. Several specimens, Cloudcroft.
75, 5109 *Listrus senilis* Lec. Wootens; common.
76, 5620? *Trox sonoræ* Lec. One specimen, Cloudcroft.
77, 5704 *Diplotaxis brevicollis* Lec. One specimen, Cloudcroft.
78, 5806 *Listrochelus disparalis* Horn. Two specimens, male and female, at light, Cloudcroft.
79, 5858 *Cyclocephala immaculata* Oliv. One specimen, electric light. Alamagordo.
80, 5865 *Cyclocephala dimidiata* Burm. One specimen at light Alamogordo.
81, 5869 *Ligyrus gibbosis* De G. Several specimens at electric light, Alamogordo.
82, 5878 *Orizabus snowi* Horn. Several specimens, very small, under stones and logs, Cloudcroft.
83, 5887 *Dynastes grantii* Horn. One specimen taken at Cloudcroft in July. Unusually high elevation. (Silver City highest previous record known to Cockerell.)

84, 5893 *Allorhina mutabilis* Gory. One specimen at Wootens. Higher up than usual.
85, 5911 *Euphoria inda* Linn. Several specimens at Santa Rosa.
86, 5950 *Ergates spiculatus* Lec. One specimen at electric light, Cloudcroft. New to southern New Mexico.
87, 5965 *Homæsthesis integer* Lec. One specimen, Cloudcroft. N.
88, *Tragosoma sodalis* Casey. One specimen, Cloudcroft. N.
89, " *parvicollis* Cas. Two specimens, Cloudcroft. N.
90, 5976 *Criocephalus asperatus* Lec. One specimen, Cloudcroft. Not before recorded south of Albuquerque.
91, 6513 var. *Tetraopes femoratus* Lec. One specimen at Wootens.
92, 6628 *Cryptocephalus venustus* Fab. Two specimens, Santa Rosa. N.
93, 6707 *Diachus auratus* Fab. Two specimens, Cloudcroft.
94, 6879 *Diabrotica tricincta* Say. Several specimens, Santa Rosa.
95, 6880*a* " *tenella* Lec. One specimen, Alamogordo.
96, 6893*a* *Trirhabda luteocincta* Lec. Several specimens, Wootens.
97, 6898 *Galeruca externa* Say. Common at Cloudcroft.
98, 6909 " *notulata* Fab. Several specimens, Cloudcroft. Very high altitude.
99, 6957 *Disonycha triangularis* Say. Two or three specimens, Cloudcroft. New to southern New Mexico.
100, 6971 *Haltica foliacea* Lec. Several specimens, Cloudcroft.
101, 10421? " *vicaria* Horn. One specimen, Cloudcroft. N.
102, 6987 *Epitrix cucumeris* Harr. Common at Wootens; feeding on corn, beans and potatoes.
103, 7027 *Phyllotreta albionica* Lec. Common at Cloudcroft.
104, 7059 *Psylliodes convexior* Lec. One specimen at Cloudcroft. N.
105, 7254 *Asida opaca* Say. Three specimens at Cloudcroft.
106, 7319 var. *Eleodes pedinoides* Lec., var. *neomexicanus* Blaisd. Common at Cloudcroft. N.
107, 7323 var. *Eleodes obsoletum* Say., var. *knausii* Blaisd. Common at Cloudcroft. N.
108, 7339 *Eleodes nigrina* Lec. A large, robust race, not very common at Cloudcroft and Wootens. New to southern N. Mex.
109, 7464 *Tribolium madens* Charp. A few specimens at Cloudcroft. N.
110, 7532 *Hypophlœus parallelus* Melsh. Two specimens at Cloudcroft.
111, *Hymenorus* sp. near *occidentalis* Casey. Two specimens at electric light Alamogordo.
112, 7740? *Oxacis pallida* Lec. Two specimens, electric light, Alamogordo.
113, 7762 *Pentaria fuscula* Lec. A few specimens at Cloudcroft. New to southern New Mexico.
114, 7820 *Mordellistena inornata* Smith. One specimen, Wootens. N.
115, 7033 " *nigricans* Melsh. Several specimens at Cloudcroft.

116, 7846 *Mordellistena unicolor* Lec. A few specimens at Cloudcroft and Wootens.
117, *Notosus montanus* Casey. One specimen, Wootens. N.
118, *Anthicus* sp. One specimen at Wootens.
119, 7959 " *cervinus* Laf. Several specimens at Wootens.
120, 8056 *Macrobasis lauta* Horn. One specimen at light, Alamogordo. N.
121, 8138 *Cantharis puberula* Lec. One specimen, Wootens. N.
122, *Otiorhynchidæ* sp. One specimen, Cloudcroft.
123, 8546 *Desmoris constrictus* Say. Several specimens, Wootens.
124, *Smicronyx* sp. One specimen, Cloudcroft.
125, *Epimechus* n. sp. One specimen, Wootens.
126, 9928? *Cossonus crenatus* Horn. Two specimens under bark, Cloudcroft. N.
127, 9074 *Pityophorus nitudulus* Mann. Several specimens, Cloudcroft. New to southern New Mexico.
128, 9200 *Hylurgops rugipennis* Mann. Common at Cloudcroft.
Five or six other undetermined species of Scolytids

A Supplementary List of the Diptera of New Jersey.

By Charles W. Johnson, Boston, Mass.

Since the publication of Prof. J. B. Smith's list of the insects of New Jersey, in 1900, I have been able to add 166 species, making the total number of Diptera recorded from the State 1359. Prof. Smith, in his investigations of the Culicidæ, has added 23 to the list, and worked out the early stages of 31 of the species. The dates of capture are recorded the same as in the main list, viz.,—the month in roman and the day in arabic numerals. In preparing this list, I am indebted to Prof. Smith for the list of Culicidæ, and to Messrs. E. Daecke, H. L. Viereck, Charles T. Greene and George M. Greene, for important data.

MYCETOPHILIDÆ.

Platyura subterminalis Say. Lucaston, ix, 2 (Daecke); Riverton, viii, 11.
fasciata Latr.? Lucaston, ix, 2 (Daecke).
clausa Coq., page 263, should read *Ceroplatus clausus* Coq.
Mycetophilus vitrea Coq. Dunnfield, Delaware Water Gap, viii, 12.

CULICIDÆ.

Culex sollicitans Walk. The common mosquito of the coast.
tæniorhynchus Wied. Anglesea, vi, 21; ix, 6 (Smith).

Culex confinis Arrib. Delair, vii, 10; New Brunswick, viii, 3 (Smith).
perturbans Walk. S. Orange, vi, 20; Lahaway, viii, 26; Chester, viii, 1–9.
canadensis Theob. Elizabeth, iv, 29; Lahaway, iv, 25; viii, 1–ix, 14; South Orange, vi, 22.
melanurus. Lahaway (Brakeley).
sylvestris Theob. Anglesea, vi, 24; New Brunswick, vii, viii; Chester, viii; Delair, viii, 10–x, 20; Elizabethport, x.
reptans Meig. Chester, x, 10–16.
cantans Meig. Anglesea, Lahaway, New Brunswick, Newark, South Orange, iv, 18–viii.
trivittatus Coq. Chester, ix, 10.
salinarius Cox. (*C. nigritulus* Coq., not Zett.). Newark and Elizabethport, viii, 30–x, 27.
restuans Theob. Anglesea, Lahaway, Delair, Newark, Chester, New Brunswick, vi, 14–xi, 20.
territans Walk. Delair, New Brunswick, Newark, Lahaway, Morristown, Mt. Olive, vi, 1–ix, 21.
cantator Coq. Summit, bred, v, 6 (Holmes); salt-marshes (Prof. Smith).
aurifer Coq. Lahaway (Prof. Smith).
dupreei Coq. New Brunswick (Van Deursen), Great Piece Meadows, Essex Co. (Grossbeck).
discolor Coq. Delair (Prof. Smith).
serratus Theob. New Brunswick, vii, 30, x, 5 (Van Duersen); Great Piece Meadow, ix, 17 (Grossbeck); Cape May Point (Viereck)
Anopheles crucians Wied. Lahaway, x, 8; Cape May, ix, 22 (Viereck); Manumuskin, x, 21 (Daecke).
Aedes fuscus O. S. Delair, iv, 21; Lahaway, v, 1.
smithii Coq. Lahaway, vi, 6–ix, 9. Bred from the pitcher plant.
Stegomyia signifera Coq. Riverton, ix, 8; Delair, ix, 20.
Conchyliastes musicus Say. New Brunswick, viii, 29; S. Orange, viii, 26.
Uranotænia sapphirina O. S. Lahaway, vii., 20–26 (Harrison).
Corethrella brakeleyi Coq. Lahaway, viii, 3–15.

CHIRONOMIDÆ

Orthocladius politus Coq. Riverton, viii, 17.
platypus Coq. Dunnfield, Delaware Water Gap, vi, 8.
Tanypus bifasciatus Coq. Riverton, iv, 30.
pallens Coq. Riverton.
occidentalis Coq. Riverton, ix, 14.
turpis Zett. Boonton, iii, 8, 12 (Greene).
Chasmatonotus bimaculatus O. S. Westville, v, 15 (Viereck).
Ceratopogon cinctus Coq. Riverton, x, 9.

Ceratopogon exilis Coq. Riverton, x, 9.
expolitus Coq. Riverton, vi, 3.
johnsoni, Coq. Riverton, vi, 3.
specularis Coq. Riverton, x, 9.
medius Coq. (MS.). Riverton, viii, 7.
mundus Coq., not Loew, = *C. smithii* Coq.
albiventris Loew, page 628, should read *Chironomus albiventris* Lw.

PSYCHODIDÆ.

Psychoda alternata Say. Cape May, viii, 20 (Viereck). Bred from water.
marginalis Banks. Riverton, v, 14.
minuta Banks. Riverton, ix, 14. Common on trunk of the buttonwood.

TIPULIDÆ.

Geranomyia canadensis Westw. Cape May, ix, 21 (Viereck).
Limnophila contempta O. S. Westville, vii, 21.
Trichocera bimacula Walk. Riverton, xi, 3.
brumalis Fitch. Riverton, xi, 3.
Amalopis vernalis O. S. Lucaston, iv, 14; ix, 28 (Daecke).
Tipula flavicans Fabr. Manumuskin, x, 21 (Daecke).
latipennis Loew. Ocean County.

BIBIONIDÆ.

Bibio longipes Loew. Common at Riverton, x, 20.
Dilophus thoracicus Say. Blackwoods, vi, 8 (Bradley).

LEPTIDÆ.

Symphoromyia cinerea Johnson. Long Branch, vi, 9–12.

STRATIOMYIDÆ.

Beris viridis Say. This is now placed in the genus *Actina*.
Ptecticus testaceus Fabr. should read *P. sackenii* Will.
similis Will., and what were referred to *P. sackenii* on page 638, should be united under *P. trivittatus* Say.
Euparyphus tetraspilus Loew. Boonton, vi, 14 (Greene).
Clitellaria subulata Loew. Riverton, vii, 8.

TABANIDÆ.

Chrysops nigrobimbo Whitney. Jamesburg, vii, 4; Da Costa, vii, 4 (Skinner).
frigidus O. S. Dover, vi, 23.
Tabanus (*Therioplectes*) *astutus* O. S. Dunnfield, Delaware Water Gap, vii.

Tabanus (*Therioplectes*) *hinei* Johns. = *T. politus* Johnson, 1890, not Walker, 1871.
gracilis Wied. Da Costa, vii, 20 (Daecke).
sodalis Will., page 642, should read *T. superjumentarius* Whitney.

ASILIDÆ.

Leptogaster flavillaceus Loew. Newark, vi, 14.
varipes Loew. Da Costa, vii, 4 (Daecke).
Daulopogon tetragrammus Loew. Clementon, v, 9; Albion, v, 16 (Daecke).
Atomosia sayii Johnson. Laurel Springs, vii, 12 (Daecke).
Dasyllis affinis Macq. Manumuskin, x, 21 (Daecke); Riverton, x, 20.

BOMBYLIIDÆ.

Anthrax lepidota O. S. Iona, vi, 16 (Daecke).
Bombylius mexicanus Wied. Iona, vi, 8 (Daecke); Riverton, vi, 16; Clementon, v, 30.
Phthiria coquilletti Johnson, Riverton, vii, 4-6, = *P.* n. sp., Jamesburg, vii, 4, page 949.

EMPIDIDÆ.

Hybos reversus Walk. Jamesburg, vii, 4; Delaware Water Gap, vii, 12.
slossonæ Coq. Buena Vista, vi, 11; Atco, vii, 12.
Syndyas polita Loew. Buena Vista, vi, 11.
Empis humilis Coq. Great Notch, v, 4 (Daecke).
Rhamphomyia irregularis Loew. Riverton, iv, 20.
mutabilis Loew. Clementon, v, 10; Wenonah, v, 14.
sordida Loew. Clementon, v, 10.
umbrosa Loew. Boonton, vi, 6 (Greene).
Pachymeria pudica Loew. Great Notch, v, 4 (Daecke).
Litanomyia elongata Melander. Avalon, vi, 9.
Tachydromia brachialis Melander. Boonton, ix, 9 (Greene).
Hemerodromia captus Coq. Boonton, ix, 5-9 (Greene).
Œdalea ohiensis Melander, in place of *O. stigmatella* Zett.? page 654.

DOLICHOPODIDÆ.

Dolichopus ramifer Loew. Avalon, vii, 22.
henshawi Wheeler. Cape May, vi, 13 (Viereck).
Gymnopternus humilis Loew. Boonton, vi, 2 (Greene).
Tachytrechus protervus Melander = *T.* n. sp., page 655.
binodatus Loew. Durham Pond, Morris Co., viii, 18 (Geo. M. Greene).
Argyra aldrichi Johnson. Long Branch, vi, 11.
Lasiargyra albicans Loew. Riverton, vi, 15 (Daecke).
Hercostomus vetitus Melander, = *H.* n. sp., on page 655.
Nematoprotus venustus Melander, Westville, vi, 6, = *N.* n. sp, on page 656.
Hydrophorus viridiflos Walk. Atlantic City, v, 6.

SYRPHIDÆ.

Callicera johnsoni Hunter. Manumuskin, iv, 28, 1902 (Daecke).
Psilota buccata Macq. Manumuskin iv, 28 (Daecke).
Melanostoma kelloggi Snow, = *Pyrophæna* sp., Delaware Water Gap, vii, 15, on page 659.
Pelecocera pergandei Will. Lucaston, ix, 28 (Daecke).
Baccha lugens Loew. Manumuskin, x, 8 (Daecke). The Atco specimen referred to this species is an immature *Ocyptamus fascipennis*.
Myiolepta varipes Loew. Clementon, vi, 2 (C. T. Greene).
Temnostoma bombylans Fabr. Riverton, iv, 4; Clementon, vi, 2 (C. T. Greene); Long Branch, vi, 9.

CONOPIDÆ.

Zodion obliquefasciata Macq. Riverton, vii, 29, viii, 11.

PIPUNCULIDÆ.

Pipunculus nitidiventris Loew. Riverton, ix, 14.
subopacus Loew. Riverton, vi, 1, vii, 19.
houghi Johnson, should be expunged from the list; see ENT. NEWS, April '03, p. 107.
pallipes Johnson. Wildwood, viii, 27.

ŒSTRIDÆ.

Cuterebra horripilum Clark. Riverton, vii, 6.

TACHINIDÆ.

Phorantha nigrens v. d. w. Riverton, x, 12, 20.
Alophora pulverea Coq. Riverton, x, 20.
diversa Coq. Riverton, x, 12.
Admontia polita Coq. Lucaston, vi, 27 (Daecke).
Clausicella johnsoni Coq. Riverton, ix, 14.
Hyalomyodes triangulifera Loew. Riverton, ix, 14.
Xanthomelana atripennis Say. Hammonton, vii, 6, 1903 (Daecke).
Distichona auriceps Coq. MS. Belleplain, ix, 8 (Daecke).
Siphosturmia rostrata Coq. Iona, v, 26 (Daecke).
Panzeria penitalis Coq. Riverton, x, 9.
Exorista spinipennis Coq. Anglesea, ix, 1.
dorsalis Coq. Riverton, viii, 25.
Euphorocera cinerea v. d. w. Clementon, iv, 21 (Daecke).
Phorocera leucaniæ Coq. Lucaston, iv, 14 (Daecke).
Frontina rubentis Coq. Clementon, viii, 6.
Metopia leucocephala Rossi. Riverton, viii, 13.

DEXIIDÆ.

Thelairodes cinereicollis v. d. w. Riverton, v, 30.

ANTHOMYIDÆ.

Eustalomyia vittipes Wahlberg. Riverton, iv, 30.
Homalomyia manicata Meig.? Lucaston, ix, 2 (Daecke).
Mydæa pruinosa Macq. Manumuskin, x, 8 (Daecke): Woodbury, vi, 7.
Limnophora arcuata Stein. Riverton, ix, 29; Manumuskin, x, 8 (Daecke).
Phaonia pallidula Coq. MS. Delaware Water Gap, vii, 12.
Anthomyia latitarsis Zett. Delaware Water Gap, vii, 15; Manumuskin, x, 20 (Daecke).
Pegomyza cepetorum Mead. Atlantic Highlands (Dr. Love).
Lispa hispida Walk. Iona, vi, 8; Lucaston, ix, 28 (Daecke).
Chirosia capito Coq. Manumuskin, x, 21 (Daecke).
Lispocephala lacteipennis Zett. Dunnfield, Delaware Water Gap, vii, 15.
Eremomyia cylindrica Stein. Riverton, x, 12.
Cœnosia substituta Walk. Iona, vi, 8 (Daecke).

SCATOMYZIDÆ (SCATOPHAGIDÆ).

Orthochæta gilvipes Loew. Manumuskin, iv, 20 (Daecke).
Hydromyza confluens Loew. Boonton, viii (Greene).
Cordylura confusa Loew? Seaside Park, v, 16 (Viereck).

HELOMYZIDÆ.

Anorostoma marginata Loew. Lucaston, v, 30 (Daecke).

SCIOMYZIDÆ.

Sciomyza pubera Loew. Riverton, ix, 29.

ORTALIDÆ.

Rivellia brevifasciata Johns. Atco, vi, 18.
Tephronota humilis Loew, = *T. narytia* Walk.
Stictocephala vau (Say), = *Pseudotephritis vau* (Say).
Callopistria annulipes Macq. Merchantville, viii, 1 (Daecke); Boonton, viii, 12 (Greene).
Chrysomyza demandata Fabr. Riverton, ix, 9; x, 20.
Chætopsis apicalis Johns. Avalon, vi, 9; Sea Isle, vii, 22; Anglesea, vii, 16.

TRYPETIDÆ.

Tephritis clathrata Loew. Riverton, vii, 19.
fucata Fabr. Wildwood, viii, 12; Cape May, viii, 1 (Viereck).

SAPROMYZIDÆ.

Sapromyza magna Coq. Avalon, vi, 8 (Viereck).

HETERONEURIDÆ.

Heteroneura spectabilis Loew. Palisades (Daecke).

SEPSIDÆ.

Ophthalmomyia bisignata Coq. Riverton, vii, 4.

EPHYDRIDÆ.

Notiphila bella Loew. Westville, vi, 15.
Psilopa fulvipennis Hine. Cape May, vii, 1 (Viereck).
Discocerina magna Coq. Riverton, viii, 17.
Brachydeutera argentata Walk. Riverton, viii, 3; Cape May, viii, 20 (Viereck).
Ephydra subopaca Loew. Arlantic City, v, 6; Seaside Park, v, 16 (Viereck).
Canace snodgrassii Coq. Atlantic City, v, 6.
Hydrellia valida Loew. Cape May, vi, 4 (Viereck).
Parydra quadrituberculata Loew. Cape May, vi, 4 (Viereck).
imitans Loew. Near Anglesea Junction, vi, 25 (Viereck).
Cænia fumosa Sten. Cape May, ix, 17, at light (Viereck).

DIOPSIDÆ.

Sphyracephala brevicornis Say. Riverton, iv, 14–20.

DROSOPHILIDÆ.

Drosophila maculosa Coq. Riverton, ix, 23.
inversa Walk. Avalon, vi, 8.
ordinaria Coq. MS. Riverton, viii, 4.
multipuncta Loew. Cape May, ix, 23 (Viereck).

OSINIDÆ.

Elachiptera formosa Loew. Riverton, ix, 8.
longula Loew. Clementon, vi, 3.
Siphonella inquilina Coq. Manumuskin, x, 8 (Daecke).

AGROMYZIDÆ.

Lobioptera lacteipennis Loew. Avalon, vi, 9.
arcuata Loew. Riverton, viii, 25; Anglesea, ix, 21; Lucaston, viii, 10 (Daecke).
Rhicnoessa albula Loew. Wildwood, viii, 27.

BORBORIDÆ.

Borborus geniculatus Meig. Merchantville, xi, 16 (Daecke); Boonton, iii, 3 (Greene).

PHORIDÆ.

Hypocera johnsoni Brues. Riverton, viii, 31.
Aphiochæta epeiræ Brues. Dunnfield, Delaware Water Gap.
flava Fallen. "N. J."
atlantica Brues. Atco.
minuta Aldr. Boonton, i, 15 (G. M. Green).
All the species referred to the genus *Phora* (Catl., page 698) should now be placed in this genus.
Conicera atra Meig. Dunnfield, Delaware Water Gap, vii, 8; Newark, vi, 14.

A New Roach of the Genus Chorisoneura from South Carolina.

By James A. G. Rehn.

Chorisoneura plocea* n. sp.

Type: ♀; Coast of South Carolina. [Collection of Mr. Morgan Hebard, of Chestnut Hill, Philadelphia.]

Apparently closely allied to *C. texensis* Saussure and Zehntner, but differing in the greater number of costal veins of the wings and the rami of the median vein of the tegmina. No close relationship appears to exist with Central American or Mexican types, *texensis* being no doubt the closest ally.

Size small; form elliptical, depressed, surface glabrous. Head exserted, the whole anterior portion projecting beyond the pronotum, rounded; eyes elongate reniform; interocular space great, equal to the length of the eye; antennæ setiferous. Pronotum transverse, elliptical, the anterior portion much more arcuate than the posterior; lateral portions regularly rounded; entire border sub-cingulate. Tegmina sublanceolate, the margins parallel for a considerable distance, apex rather acute-angulate; basal field rather narrow, elongate, not reaching to the middle of the tegmen; costal veins numerous and regularly dispersed; rami of the median vein about twelve in number; anal field elongate pyriform, with four distinct veins. Wings elongate; costal margin concave basally, convex toward the apex; appendicular field with the base obtuse-angulate, apex broadly rounded; costal veins about twelve in number, elongate-clavate; medio-discoidal area broad, with ten cross-veins, broader than the medio-ulnar area; ulnar vein without true rami; anal vein biramose. Supra-anal plate transverse, obtuse-angulate, the angle with a narrow triangular incision; cerci elongate-fusiform, depressed, equal to the subgenital plate in length; subgenital plate broad, transverse, apical margin truncate. Femora without distinct spines on the inferior margins, geniculars spines present.

General color pale ochre yellow; wings pellucid, with the veins yellowish; disk of the pronotum orange-ochraceous; eyes blackish-brown; abdomen raw sienna, the segments ventrally margined with buff.

Measurements.

Length of head and body,	8.	mm.
Length of pronotum,	2.	"
Greatest width of pronotum,	3.2	"
Length of tegmina,	8.2	"
Greatest width of tegmina,	2.9	"
Length of wings,	8 5	"
Greatest width of wing,	5.5	"
Greatest length of appendicular field,	5.	"
Greatest width of appendicular field,	2.9	"

* From πλοκια, in allusion to the folding of the wing.

Micro-Lepidoptera—Suggestions.

By W. D. Kearfott.

(Continued from p. 136, Vol. xv, No. 4.)

Part III.—Breeding.

I am quite sure the only reason that every American collector does not increase his collection by breeding from the larvæ is the immense bugaboo he has raised up in his mind of the difficulties, extra work and elaborate cages and apparatus required.

In England and throughout Europe the acquisition of specimens by this method is, if anything, more common than catching the perfect insects with a net. The great majority of species offered through the "Exchange columns" of European magazines state that the specimens are "bred."

The apparatus actually required for the work is absurdly simple,—a few tight tin or zinc boxes and wide-mouth vials for the field and a few common jelly-glasses with tight tin covers or small wide-mouth screw-top jars for the house, are all the apparatus required for a beginning.

It is a mistaken notion of the average collector that larvæ must be raised in cages, with gauze wire on one or more sides to give an abundant supply of air. The amount of air actually required is so infinitesimal that no provision at all need be made for it. A very great advantage of the tightly closed vial or jar is that the leaves or food of the larvæ will retain their freshness and palatability for a week or ten days; whereas, with the wire cage, the leaves are often wilted and stale a few hours after they are placed in it.

The great secret of success is cleanliness, which will be elaborated on later.

For Micro-Lepidoptera larvæ I prefer for actual collecting in the field the screw-top glass vials shown at Fig. 17. Their advantages are that they are light in weight and occupy but little room; several dozen can be carried in the khaki cartridge-bag; they are transparent, and it is easy to select an empty vial or pick out one that contains some particular kind of larva to which we wish to add more specimens, and finally if no further study of the larvæ is required, they can be placed in

racks at home without further attention and used as breeding bottles. I usually carry along a few tin boxes, quarter-pound tobacco or cocoa tins are of a convenient size, to provide for such larvæ as may be found in large numbers, or that feed in such a way that larger receptacles are necessary.

These vials come in several lengths. I use two sizes, one three and a half inches and the other five and a half inches long, both about seven-eights of an inch diameter.

Fig. 17.

It is very convenient, and often avoids the danger of mixing different species, to carry a small pad of paper and pencil, and slip in each bottle as it is put in use a narrow slip with name of food-plant written on it or, if name is not known, some word or two of identification.

The time for collecting larvæ begins when the buds are first swelling and bursting in the very early spring, and can be continued as long as the leaves remain in the fall,—in fact, during the entire winter in the stems of weeds and other plants, in nuts and seeds and many other places,—which latter subject—winter collecting—is another story—for the fall.

But we now have to do with the first spring crop of caterpillars, and will start out together this warm May morning, and see how soon we can get all of our vials and boxes filled, and resolved not to be diverted by a single flying specimen, no matter how attractive it may look. By the quickest route we arrive at the outskirts of the town and avoiding the dense woods, enter a field overgrown with weeds and occasional clumps of higher shrubbery. The first thing to attract attention is the unusual appearance of the young leaves of the wild cherry bushes; instead of being smooth and perfect they are crumpled and twisted into a knot, as if nipped by a late frost; but by carefully pulling apart the

entangled leaflets, a small green larva with a black head will be found in a central cavity, and if we are not very careful he will wriggle away so quickly that he will escape to the ground and be forever lost. We can soon fill a vial with these, breaking off the crumpled leaves only, and carefully avoiding opening them or disturbing the tenants, as it is reasonably sure that if the first one examined is occupied, all others on the same kind of plant and of same general appearance will contain each its larva. A few weeks later the moths that emerge will likely prove to be *Archips rosaceana* Har.

Happening to glance downward, our attention is attracted by the peculiar appearance of some of the leaves of the late purple aster (*Aster patens* Ait.), which at this early season of the year is but a slender stalk twelve to fifteen inches tall, with delicate leaves shaped like a spear or arrow-head ; several leaves on each plant have one edge, for the entire length of the leaf, evenly turned up and fastened down, forming a little tunnel open at each end, about an eighth of an inch in diameter, looking almost like the retreat of a small spider.

In some of these tunnels will be found a very pretty larva with head and thoracic segments a deep mahogany brown and the abdominal segments pale green, with a number of narrow dark red stripes on the back and sides running from the thorax to the anal end. We will collect as many of these as possible, as the moth that will come from them is a very beautiful Gelechid, *Trichotaphe flavocostella* Clem.

Close by is a small pitch-pine sapling. Some of the needles look dead and brown for about half of their length. Let us see what is the reason. A close look, and at the beginning of the discolored part is a small hole, and if we break one off and hold it up to the light, about the center of the brown space will be seen a long dark object that careful dissection of the needle will prove to be a very small larva, that exactly fits the inside of the excavated needle ; fifty or more can be comfortably stowed away in one of our vials and, without any attention whatever, will shortly produce a nice crop of *Paralechia pinifoliella* Cham.

Next are some bushes of *Viburnum*, or locally known as

Black-Haw or nanny-goat-berry. A pair of leaves are as evenly fastened together at their edges with silk as if they had been sewed with a needle. Within the comfortable little envelope is a rather fat pale-green larva, ornamented with many shiny dark-brown spots, in due time it will produce a beautiful ash-gray moth, *Anacampsis rhoifructella* Clem.

On Bayberry bushes nearby, the tips of the twigs and young leaves are gathered together in a small bunch, and if the larva is pale lusterless green with light-brown head, it will probably develop into *Archips persicana* Fitch.

Here is another *Viburnum* bush, but instead of two leaves sewed together, one leaf has its outside edges brought together and then doubled over, just like we would make two folds in a napkin. The larva is bright green with a pale-yellow head. In good season it will develop into a handsome Tortricid—*Exartema permundanum* Clem. Another Tortricid of the same genus, *Exartema zellerianum* Fern., crumples and distorts the young leaves of White Birch in the same manner as the Wild Cherry species first mentioned.

Under an oak tree at the edge of the woods are a goodly number of last season's acorns that seem to have been neglected by the squirrels; we will cut a few open to investigate. Instead of finding them firm and full of meat, we are at first disappointed to see that each contains nothing but dark-brown powdery dust, but stir up this dust a little with blade of penknife and a larva is discovered; turn out the contents on the palm of the hand and we shall likely find two, both dull gray, one nearly half an inch long and rather stout, and the other slender and only about a quarter of an inch long. The large one is a beautiful Tortricid, *Mellisopus latiferreanus* Wlsm., bright coppery-red with shining metallic-gold stripes across the wings; the small one is a beautiful little Gelechid, *Holcocera glandulella* Riley.

Just outside of the woods are some dry stalks of last year's Evening Primrose. Mother Nature is never wasteful; so we will see what good purpose these useless-looking sticks are performing in her system of economy. With a sharp knife carefully split one in half, from the flower-head to the root,

and at intervals of a few inches apart, we are not now surprised to find cleanly excavated cells, in each of which is a slender pale-yellow larva. When ready to pupate he will spin a soft white cocoon in his cell and emerge about the last of June: but before spinning the cocoon his instinct tells him that the delicate moth cannot penetrate the thick woody wall of the stalk, so he carefully gnaws a small hole through and then, to keep out evil-minded enemies, he covers the hole with a thin curtain of silk. In his perfect state he is known as *Mompha eloisella* Clem., and a very beautiful object he is, shining pearly white, with red and gold markings.

Nearby is a small Hop-tree (*Ptelea* sp.) with many of its leaves drooping, and in a short time they will shrivel up and drop off. With our now experienced eye, we very quickly discover that a small slender caterpillar has made its home in the stem of each leaf. We will fill up a tin box with a good number of these, cutting the stems off close to the branch and leaving a good supply of both live and wilted food. Within a few weeks we will have a nice crop of *Yponomeuta atomocella* Dyar, a very handsome little moth, with salmon hind wings and the pure white fore wings thickly peppered with black dots.

If this is not sufficient material for one morning's work, we can keep up the hunt, and will soon learn that every species of plant-life supports one or many species of insect-life; we shall also quickly learn that each species of insect has its own peculiar and individual way of twisting or crumpling the leaves, sometimes at the tip of the twig and elsewhere. Some curl the leaves into small cylinders; some cut halfway through the stem and hide in and feed on the rapidly withering leaf, preferring this to green and tender young leaves. Others live in the stems and sapwood, in nuts, flower-heads, seeds and seed-pods, in mushrooms and fungoid growths, on the lichens of trees and rocks; many species are leaf-miners, and as most of us have had an opportunity of finding to our sorrow, one very disagreeable little Tineid will even eat the other specimens in our cabinets.

(To be continued).

ENTOMOLOGICAL NEWS.

[The Conductors of ENTOMOLOGICAL NEWS solicit and will thankfully receive items of news likely to interest its readers from any source. The author's name will be given in each case, for the information of cataloguers and bibliographers.]

To Contributors.—All contributions will be considered and passed upon at our earliest convenience, and, as far as may be, will be published according to date of reception. ENTOMOLOGICAL NEWS has reached a circulation, both in numbers and circumference, as to make it necessary to put "copy" into the hands of the printer, for each number, three weeks before date of issue. This should be remembered in sending special or important matter for a certain issue. Twenty-five "extras," without change in form, will be given free, when they are wanted; and this should be so stated on the MS., along with the number desired. The receipt of all papers will be acknowledged.—ED.

PHILADELPHIA, PA., MAY, 1904.

Proceedings of the First General Convention to Consider the Questions Involved in Mosquito Extermination, Brooklyn, 1904. This booklet has just been received and it shows the rapid growth of knowledge in relation to this important subject.

In 1889 Dr. Robert H. Lamborn became greatly interested in the subject of mosquito extermination, and stimulated an interest in the subject by offering prizes for essays along these lines. The essays appeared in book form under the title "Dragonfles *vs.* Mosquitoes. Can the Mosquito Pest be Mitigated?" During the fourteen years since the Lamborn essays there has been an immense gain in knowledge which has accrued mostly from the work of the medical officers in the United States Army during the Spanish-American war. Great good has also come from the efforts of Dr. John B. Smith in New Jersey, who has demonstrated ways and means and carefully explored the possibilities and probabilities for the future, and his survey of the State of New Jersey will be found very valuable to workers in other places. The value of such studies is almost incalculable. A single illustration will suffice. The annual mortality from yellow fever in Havana has been nearly 2000 cases for forty years, or as far back as the record has been kept. At the present time the disease is under control in Havana and the mortality nil or trifling. Malaria and yellow fever have lost their terrors, as we know how to control them, and it is now only a question for municipal or State effort to see that the appropriate measures are carried out or enforced.

Notes and News.

ENTOMOLOGICAL GLEANINGS FROM ALL QUARTERS OF THE GLOBE.

THE session of the Alstead School of Natural History for this year will open on Wednesday, July 6th. The school is at Alstead Centre, N. H., and the Secretary is Mr. W. S. W. Field, Milton, Mass.

TWO RARE NEUROPTEROID INSECTS.—*Panorpa rufa*, described from Georgia, by G. R. Gray in Griffith's Edition of Curvier's Animal Kingdom (1833), has not been recorded since. Mr. Hine in his revision of the Panorpidæ of the United States, did not have it, and it has been the one species lacking in my collection of this genus. In a collection of neuropteroid insects from North Carolina sent me by Mr. F. Sherman, I find one specimen of this species agreeing exactly with the description even to the four hyaline dots in the apical band. The wings are not as yellow as in *P. americana* and *P. nuptialis*, and I think that the species is more nearly related to *P. subfurcata*. The specimen was taken in Wilmington on Christmas day.

Mantispa viridis was described from Florida by Walker in his catalogue. Its green color was so abnormal to the genus that some authors doubted its position. Last year Mrs. Slosson sent me a specimen from Biscayne Bay, Fla., and later Prof. C. F. Baker sent a specimen from Grenada, Nicaragua. It has the green color of a *Chrysopa*, but does not differ in other ways from ordinary *Mantispa*.—N. BANKS.

MEGACHILE SEXDENTATA Robertson.—Miss Anna Gohrman recently sent me a female *Megachile* collected July 31, 1903, by Karl Schivackheim at Raton, N. M. I was surprised to find that it was *M. sexdentata* Rob., hitherto only known from Illinois. This is an ordinary looking bee, but upon close examination it is seen to have very good specific characters; from its occurrence in Illinois and New Mexico, it may be expected to occur in many States, and collectors should look out for it. Miss Gohrman also sent a couple of species of *Osmia* which she collected on July 4, 1903, at loco flowers at Johnson Park, N. M. They prove to be *O. nigrifrons* Cress. and *O. novomexicana* Ckl., the latter only the second specimen known. The list of New Mexico bees now numbers 511,* not counting a dozen or more undecided species obtained by Mr. Viereck, and a number of unrecorded and probably new *Colletes*, *Halictus* and *Andrena*, now being studied by Messrs. Swenk, Crawford and Viereck respectively.—T. D. COCKERELL.

CURIOUS HABIT OF TWO ORTALID FLIES.—It has long been known to all collectors that many Ortalid flies have the habit of moving their wings back and forth, sometimes in unison, sometimes alternately, as though

* The whole of North America (including Central America and West Indies) has about 1882 recorded species. Probably a hundred more have been distinguished as new by Mr. Viereck and others.

taking calisthenic exercises. I have observed two species, however, which have a different habit. These are *Callopistria annulipes* and *Pseudotephritis vau;* the latter has been observed but twice, the former many times. These flies, when at rest, sometimes, turn their wings and raise them directly over the back so that the costal edges touch and the under surface is directed forward. The wings are held vertical, and together make an oval figure In this position the fly struts around as if to show off. I have seen no reference to this habit, save that Harris in his "Treatise" says "Some of them are in the habit of suddenly raising their wings perpendicularly above their backs, and running along a few steps with them spread like the tail of a peacock," but he does not mention the species. The dipterous genus *Callopistria* is preoccupied several times.—N. BANKS.

Doings of Societies.

The February meeting of the Newark [N. J.] Entomological Society was held on the 14th with President Keller in the chair and nineteen members present. Prof. Smith gave a very interesting lecture on classification and synonomy in general and in Lepidoptera in particular. Mr. Edward Kraemer was proposed for membership. OTTO BUCHOLZ, *Secretary.*

The March meeting of the Newark Entomological Society was held on the 13th with President Keller in the chair and sixteen members present. The members decided to purchase the following publications: A collection of 76 papers on Coleoptera published between 1860 and 1880, by Dr. G. H. Horn. A collection of 109 pages on Coleoptera published between 1845 and 1880, by Dr. J. L. Le Conte, and Holland's Moth Book. Mr. Dickerson read a very interesting paper on the sensitive organs of insects and showed microscopic plates for illustration. Mr. Edward Kraemer was unanimously elected to membership. The gentleman elected to honorary membership in January was not a Mr. Bronson, as published, but Mr. Julius Bunsow. OTTO BUCHOLZ, *Secretary.*

At the meeting of the Feldman Collecting Social held at the residence of Mr. H. W. Wenzel, 1523 South 13th Street, Philadelphia, March 16th. Ten members were present.

Mr. Harbeck spoke on the use of horse hair for mounting small insects, being used in place of paper slips, etc. The

hair is attached to the pin by shellac into which one end is inserted at a proper heigth.

Discussed by Messrs. Wenzel and Skinner.

Mr. Daecke exhibited a cell in hickory wood of *Cyllene picta* in which a full grown specimen had been found.

Mr. H. W. Wenzel spoke on the habits and differences of *Cyllene picta* and *robinæ*. He also showed his collection of *Buprestis*, which lacks only one American species, the *connexus* of Horn.

Dr. Skinner reported the death of Dr. Hans Herman Behr on March 7, 1904.

Mr. Reinick reported the occurrence of large numbers of winged ants which appeared on March 15th in the building of the Free Library of Philadelphia.

Messrs. Skinner, Wenzel and Harbeck spoke on *Anthrenus varius* and other museum pests.

WILLIAM J. FOX, *Secretary*.

The March meeting of the Entomological Section of the Chicago Academy of Sciences was held Thursday, March 17th, at the John Crerar Library. Eight members present. The report of the Honorary Curator, Mr. A. B. Wolcott, on the condition of the Academy collection was presented. It recited the acquisition by purchase of 600 specimens, 300 species of Diptera all new to the Academy collection. Mr. C. W. Johnson has examined and determined all the Diptera in the collection and these are now in excellent shape. Mr. W. L. Melander did likewise with the Mutillidæ and the type of one of his recently described species is now a part of the collection. The insects which formed the collection of the Chicago Entomological Society, consisting principally of Lepidoptera, Coleoptera and Neuroptera have made quite an addition. Mr. Wolcott has further employed his leisure time in removing from the exhibition cases such species as were required for the study collection and in revising things generally.

Mr. Tower exhibited a list of Rhopalocera taken in the Chicago area which showed a total of 112 species and 7 varieties. There was some discussion on the various systems of

nomenclature in the Rhopalocera, and it was finally agreed that Dr. Skinner's names as given in the new Smith's list would be best to use.

Mr. Tower thereupon proceeded with his talk on color variations in insects as affected by climatic changes. He gave a very interesting resumé of the results achieved by various prominent entomologists in subjecting fresh pupæ of butterflies to freezing temperature, etc., and went more into detail on the experiments he is now conducting with the common potato beetle as a subject. After a little informal talk the meeting adjourned at 9.50 P.M. A. KWIAT, *Recorder.*

A meeting of the Entomological Section of the Academy of Natural Sciences of Philadelphia was held March 24th, Mr. H. W. Wenzel, Vice-Director, presiding. Thirteen persons were present. Dr. Calvert exhibited a collection of nymphs of Odonata from New Jersey which he had identified for Prof. John B. Smith. The determinations were made from Prof. Needham's keys and descriptions which he had found very satisfactory. Among these specimens were some which agreed with the skin of the nymph from which Mr. H. L. Viereck had reared *Micrathyria berenice* Drury, as mentioned in the NEWS, Vol. xiv, p. 276.

The nymph of this species, hitherto undescribed may be recognized by the following characters. Abdomen somewhat similar in outline, when viewed from above, to that of *Libellula basalis*; without dorsal hooks, their place being taken by a carinate tubercle on each of segments 3–9, this tubercle quite hairy, especially on 6–9; only 8 and 9 with lateral hooks, those on 8 being about one-fifth as long as the mid-dorsal length of 9, those on 9 subequal to the mid-dorsal length of 10, both hooks incurved, those of 9 more strongly. Inferior appendages subequal to the mid-dorsal length of 9, laterals half shorter, superior one-fourth shorter. Eyes quite prominent, reaching back to almost half the length of the head, which last is much narrower behind them. Mental setæ 10–11, the fourth to seventh from outer side longest. Lateral labial setæ 9–10, movable hook almost straight, 11–12 crenulations on the opposing (distal) edges of the lateral labial lobes. Length of the

shed skin 14 mm. Dr. Skinner exhibited what he took to be the larvæ of *Parandra brunnea*. They were infesting a buttonwood tree in Logan Square, Philadelphia, and were present in large numbers. The speaker remarked that he had never seen an imago in the Square. Mr. Wenzel said the imago seldom leaves the tree. He mentioned the fact Mr. Beyer had had taken *Parandra polita* at Norfolk, Va., previously recorded from Texas and Mexico. Mr. Huntington said the Aristotle Society had been fairly successful in getting reports on the Lepidoptera and Coleoptera for the proposed Pennsylvania list. Dr. Calvert said that wings were present in larvæ of both sexes in the Tussock moth, and asked if any one present had noted the fact or had seen any reference thereto.

HENRY SKINNER, *Recorder.*

Minutes of meetings of Brooklyn Entomological Society, Brooklyn, N. Y.

November 6, 1902.—Twenty-two persons present. Prof. John B. Smith, president, in the chair.

Dr. Call reported, for the committee on "Revision of Glossary of Entomological Terms," as to the cost of compiling and publishing 500 copies of a volume containing 125 pages, and after discussion, subscriptions to the extent of $200 were assured by those present.

Mr. Charles Myers, of Bronx, and Messrs. William Schwenke and Otto Dederer, of Brooklyn, were elected members.

Mr. Martin exhibited specimens collected by himself during the past season at Worms and Bierstadt, Germany. Lepidoptera were numerous. Electric lights were very productive.

Mr. Doll reported his taking of many specimens of a variation of *Eacles imperialis* larvæ in the Catskills which differed structurally from the ordinary type, particularly in the shortening of the spines.

Mr. Pearsall reported his capture of a specimen of *Platarctia hyperborea* on the summit of one of the Catskills.

Mr. Shoemaker stated that he had taken the third known specimen of *Sphinx franckii*, at Washington, this summer, the second having been taken by him several years since.

Mr. Franck remarked that he took the first specimen of this insect in Kansas City many years ago, and that he regarded it as a hybrid between *chersis* and *kalmiæ*.

Prof. Smith stated that of the seventeen species of mosquitoes indigenous to New Jersey he had bred all but two, and gave portions of the life-history of those which he had studied. The popular description of the "egg-boats" applied only to one species. Other species oviposited in moist peat, etc., where they awaited water for development. Marsh mosquitoes rarely entered dwellings.

General discussion on question as to the period of fertilization, whether fall or spring, of certain hybernating species. It appeared that where both ♂ ♂ and ♀ ♀ survive the winter, this occurred in the spring.

December 4, 1902.—Twenty-four persons present. Prof. John B. Smith, president, in the chair.

Prof. Smith, of the Glossary Committee, reported progress.

Mr. Weeks read an article written by his father, the late William J. Weeks, of Suffolk Co., L. I., and published in the *Scientific American* of 1857, offering a solution of the method whereby the honey-bee (*Apis mellifica*) was enabled to construct its cells with more or less regularity,—viz., by the employment of its antennæ as a standard of measure, the identity in length and angle of these organs with the dimensions of the cells having been established by the examination of numerous workers.

Discussion by Dr. Call and Messrs. Roberts, Joutel and Weeks.

Mr. Charles Dury of Cincinnati, made a brief statement of the interest taken in entomological studies in his city,

Prof. Smith exhibited some lantern slides showing a series of notodontian larvæ resting upon their respective food-plants, and also slides illustrating the methods of breeding certain Coccinellids imported from Australia and China and employed in the destruction of scale insects infesting the orange, fig, etc., and lastly slides illustrating scenes in California, obtained during his last visit to that State.

ARCHIBALD C. WEEKS, *Secretary*.

EXCHANGES.

Not Exceeding Three Lines Free to Subscribers.

☞ These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and only when necessary those at the top (being longest in) are discontinued.

Cicindelidæ wanted.—Cash or exchange for other insects.—Charles Stevenson, 906 St. Urbain St., Montreal, Canada.

Lepidoptera wanted.—*Chrysophanus hypophleas* and vars., from all parts of North America. Also *Arg. atlantis* and *electa*, and many common Noctuidæ, including *Cosmia paleacea*.—E. H. Woolley Dod, Millarsville, Alberta, N. W. T., Canada.

Lepidoptera.—I have 200 *cecropia*, 100 *polyphemus* and 400 *cynthia* cocoons to exchange for other North American Lepidotpera.—Ferdinand Goeben, 464 Atlantic Ave., Brooklyn, N. Y.

Wanted.—Tortricids and Micro-Lepidoptera, especially from the West. Will pay cash and furnish pins, mailing boxes and full instructions.—W. D. Kearfott, 114 Liberty St., New York, N. Y.

Lepidoptera.—For exchange, fertile eggs of *Hemileuca maia*—Alfred C. Sampson, Sharon, Mass.

Exchange.—Would like to exchange Coleoptera from Austria for N. American. Correspondence German and French.—Otto Spicack, K. K. Postbeamtor, Sternberg, Mähren, Austria

Illinois, Lake Superior, Texas and Californian Dytiscidæ wanted in exchange for Dytiscidæ and other Coleoptera.—John D. Sherman, Jr., 390 Halsey St., Brooklyn, N. Y. City.

Wanted.—In exchange or for cash various species and varieties of the genus *Eubaphe* (*Crocota*). Other Lepidoptera also desired, especially mounted specimens. Send lists to A. Kwiat, 701 Larrabee St., Chicago, Ill.

Polistes.—I wish to correspond with entomologists all over the country who are willing to aid me in the study of this genus.—S. Arthur Johnson, Fort Collins, Colo.

Wanted.—Bulletin Brooklyn Entomological Society, vol. i, No. 10, or the complete volume.—Wm. J. Fox, care of NEWS.

Will exchange North American Lepidoptera for native, Exotic or European species. Send lists to Jos. H. Reading, 775 North Rockwell Street, Chicago, Illinois.

A full line of Arizona Coleoptera. Apply to agent, Mr. Chas. Palm, 172 East 64th Street, New York; Dr. R. E. Kunzé, Phœnix, Arizona, U. S. A.

Moths of Pennsylvania and New Jersey. The undersigned will give good exchange in cash or specimens for moths of Pennsylvania and New Jersey that are new to his collection. Send list of rare species only. Philip Laurent, 31 East Mt. Airy Ave., Philadelphia, Pa.

Native pupae for exchange, including *regalis, ceanothi, luna, calleta.* Native pupæ desired. W. T. Buxton, 17 Walter Street, Somerville, Massachusetts.

Lepidoptera. I have a few *luna* cocoons to exchange for *ceanothi* or pupæ of *Papilios* not found in this locality.—Miss Kate W. Strong, Setauket, Long Island, New York.

I have a few live pupæ of *Deidamia inscriptum* to exchange. I wish live pupæ of *Darapsa versicolor* and *Calasymbolus astylus*.—R. R. Rowley, Louisiana, Mo.

Megachilidae of the Americas wanted for study. Will exchange or purchase.—E. S. G. Titus, Div. Entom. Dept. Agric., Washington, D. C.

Wanted.—Copies of ENT. NEWS for January, 1903, Vol. xiv, No. 1.—Henry Skinner, 1900 Race St., Philadelphia, Penna

Lepidoptera.—*Papilio gundlachianus* for exchange.—Captain Wirt Robinson, Fort Caswell, North Carolina.

Wanted for Cash—Living cocoons or pupæ of Lepidoptera of U. S. A. W. T. Page, 6 Rylett Crescent, Shepherd's Bush, London, W., England.

Lepidoptera to exchange for specimens not yet in my collection. Send lists to Adolph Fischer, 502 School Street, Chicago, Ill.

Exchange.—Coleoptera in papers, with data. Will collect in this locality this season. Send lists.—Rev. J. C. Warren, Elma, Iowa.

Have for exchange.—Named species of Coleoptera, named and unnamed species Lepidoptera, Hymenoptera, Diptera, Neuroptera and Odonata of this locality, for named species of U. S. and Canada.—A.W. Andrews, 180 Helen Ave., Detroit, Mich.

Wanted.—Material for the study of the hybrid or polymorphic butterflies of the genus *Basilarchia*, including larvæ or pupæ of *arthemis* or *astyanax*, imagos of *proserpina* or *arthechippus*, or any specimens showing unusual characters. Liberal exchange. Specimens retained will be deposited in Museum of Comparative Zoology.—W. L. W. Field, Milton, Mass.

Cicindela wanted (Henshaw Numbers 19 to 32b inclusive), Coleoptera for exchange. Will collect in all Orders. Write before collecting.—V. E. Shelford, Zoology Building, Univ. of Chicago, Chicago, Ill.

Butterflies.—Will collect in this vicinity the coming season in exchange for named specimens in papers or expanded, found in other localities.—C. E. Montgomery, 10 Cabot St , Portsmouth, N. H.

Wanted—Insect galls and host plants for the study of distribution. Will exchange specimens.—Mel T. Cook, Greencastle, Ind.

Wanted.—Fertile eggs of *Citheronia regalis* and *Basilana imperialis*. Will pay cash for twenty-four of each.—Phineas Whiting, 106 Fairmount St., Lowell, Mass.

Fertile ova of *Attacus yama-mai*, *Rhodia fugax*, *Calligula japonica* and *cecropia-ceanothi* hybrids for good exchange; will give cash or exchange for pupæ of *angulifera* and *ova* of *H. nevadensis*.—Jas. Mitchell, 212 Indiana Trust Building, Indianapolis, Indiana

I have *Triptogon occidentalis*, *modesta*, *Sphinx chersis*, *Amp. versicolor*, *Catocala relicta* var. *bianca*, *phalanga*, *lacrymosa*, *frederici* and pupæ of *P. astylus* in exchange for others of same genus or for small white roses.—Chas. F. Timm, 131 Ralph St., Brooklyn, N. Y.

Orthoptera.—Determined Colorado species to exchange for species not represented in the Collection here. C. P. Gillete, Ft. Collins, Colo.

Wanted —*Papilios* of the world. Must be perfect. Send list and state what you wish in exchange. C F. Groth, 141 E. 40th St., New York.

Wanted in southern and western United States correspondents who will collect *Cicindela* in exchange for named Coleoptera of Mexico, South and Central America, Europe and Australia. Write at once. Zoological Museum, 37 Zoological Building. University of Chicago, Chicago.

Insects of all orders, chiefly from Kansas, Colorado, New Mexico and Arizona, for North Amercan species not in my collection. List of duplicates and desiderata on application. F. H. Snow, Lawrence, Kansas. (Prof. Systematic Entemology in the University of Kansas.)

Wanted, to complete files: Illinois State Laboratory Natural History, Bulletin, Vol. i, Nos. 3 and 4; Vol. iv, articles, 9, 14 and 15; Vol. v, articles 1 and 6 Many valuable exchanges to offer in different groups and subjects. James G. Needham, Lake Forest, Ill.

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